LPS Bulletin – Reliability
RI-5 Rheniformer-Fire at E-570B 14-Oct-09

IPS Control: 1674806

Location: Richmond – 5 Rheniformer

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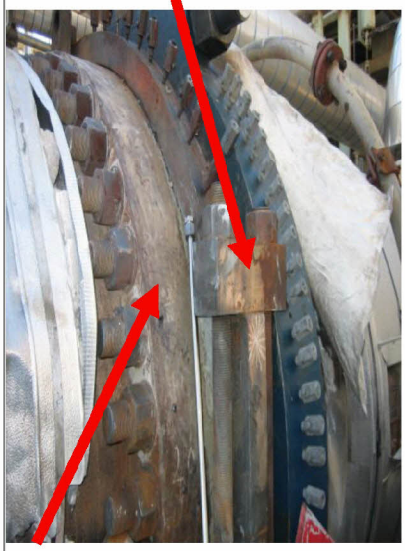
New Clamp: Tube sheet to Shell



Old Clamp: Channel to Tube sheet

Tenets of Operations Violated:

6) Always maintain integrity of dedicated systems

URIP
Design/Care/Fix/Prevent

Incident Description:

While the plant operator was performing routine tasks, it was noted that there was a fire on E-570B, a feed/effluent heat exchanger, at the "Channel to Tube" sheet flange (See attached picture). The operator informed the Head Operator (HO) of the fire and applied smothering steam to the affected exchanger. The fire grew in scope and the operator applied water from a fire monitor to the affected exchanger. The CFD (Chevron Fire Department) quickly responded to the scene. The plant was shut down in a controlled manner.

Investigation Findings:

1. These exchangers have leaked in the past and the situation has been addressed by clamps.
2. Threaded tubesheet design on this exchanger makes the connection much stiffer as it reduces the amount of available stretch in the stud that can compensate for some of the relaxation of the gasket.
3. The tubesheet is threaded on the channel side, so the amount of stud stretch on the channel side is less than the stretch on the shell side.
4. The clamp that was in place on exchanger leaked.

Lessons Learned / Business Practices:

1. New/ Enhanced Engineering Design is an important tool in preventing future incidents/ hazards such as this.
2. Given that these exchangers are known leakers, changes are already in place and a more reliable gasket (enhanced design with different geometry and rated for higher loads/temperatures) will be installed and a new style bolting pattern used.
3. Higher tension is needed to prevent leaks due to gasket relaxation on exchangers.
4. Generally, clamps may be used to stop leaks when the equipment cannot be shutdown, and refinery instructions require removal of clamps and equipment repair during planned shutdowns.

What Worked Well:

1. First Response by the Plant Operator and HO were ideal.
2. These Exchangers have attached smothering steam rings and worked accordingly.
3. Location of nearby fire monitor aided Operations in successfully putting out the fire.

Recommendations:

1. Determine what other exchangers in the refinery are at risk to this same problem.
2. Install new, more reliable gasket on all flanges (enhanced design with different geometry and rated for higher loads/temperatures) and use new style bolting pattern on this exchanger and others in same service/process to ensure proper tension on gasket.